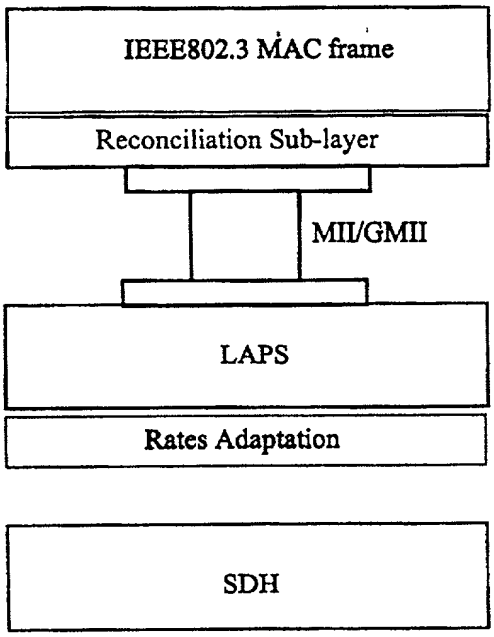
IEEE802.3 MAC frame
Reconciliation Sub-layer
MII/GMII
LAPS
Rates Adaptation
SDH

Fig. 1

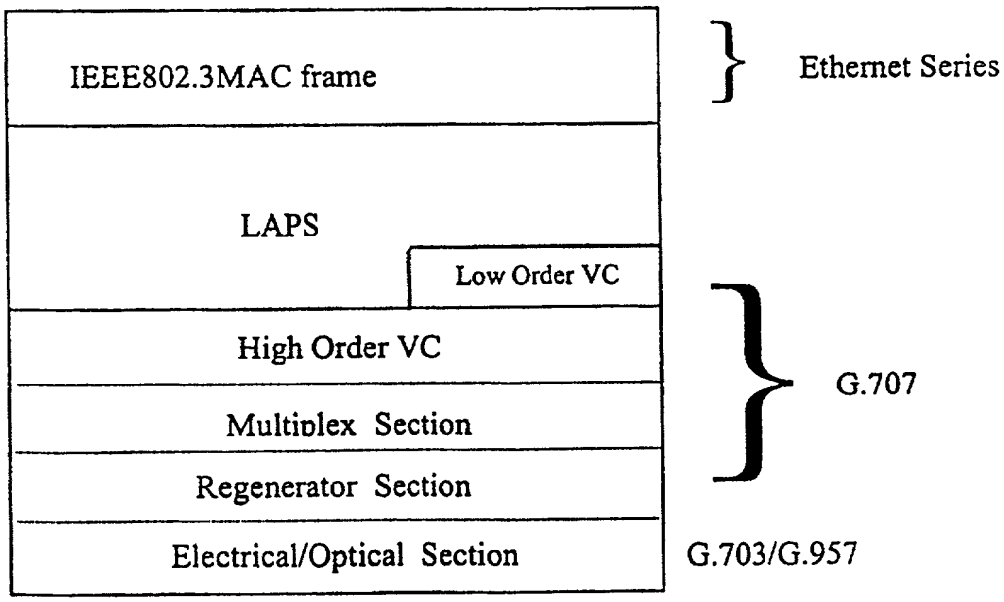
IEEE802.3MAC frame
LAPS
Low Order VC
High Order VC
Multiplex Section
Regenerator Section
Electrical/Optical Section
Ethernet Series
G.707
G.703/G.957

Fig. 2

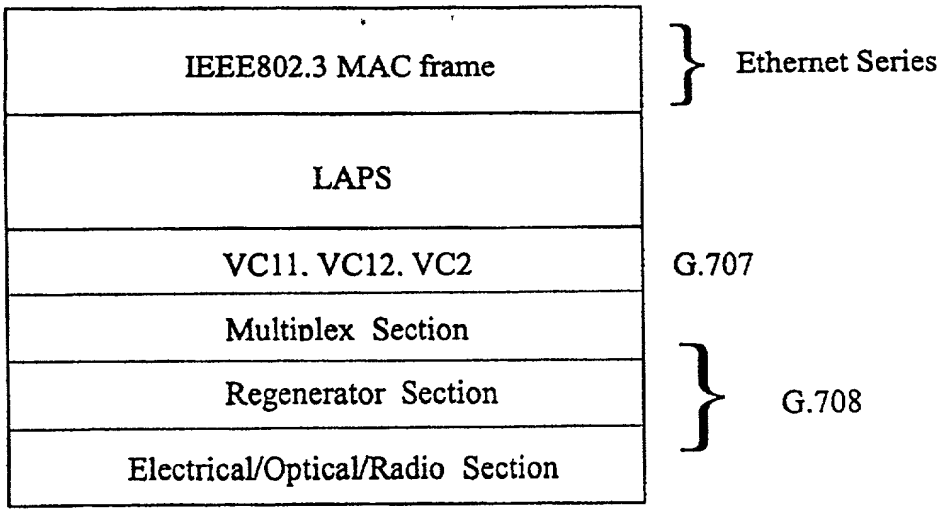
IEEE802.3 MAC frame
Ethernet Series
LAPS
VC11. VC12. VC2
G.707
Multiplex Section
Regenerator Section
G.708
Electrical/Optical/Radio Section

Fig. 3

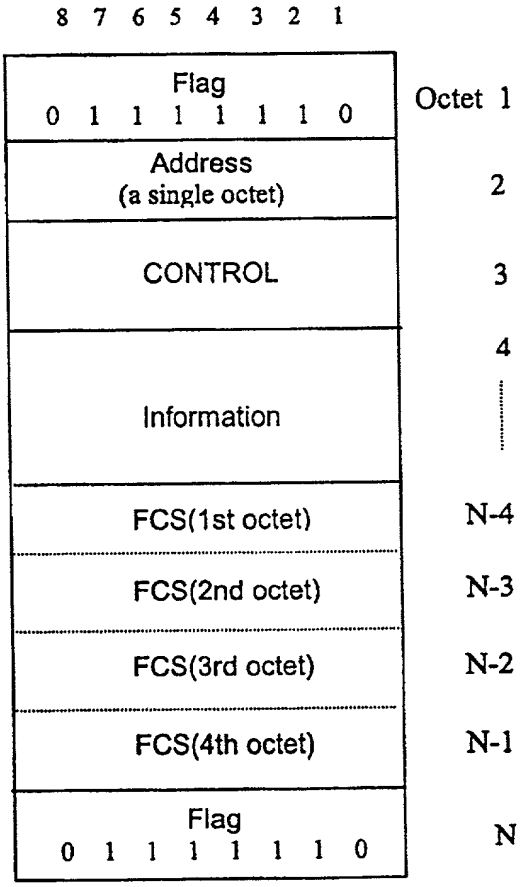
8 7 6 5 4 3 2 1
Flag
0 1 1 1 1 1 1 0
Octet 1
Address
(a single octet)
2
CONTROL
3
Information
4
FCS(1st octet)
N-4
FCS(2nd octet)
N-3
FCS(3rd octet)
N-2
FCS(4th octet)
N-1
Flag
0 1 1 1 1 1 1 0
N

Fig. 4

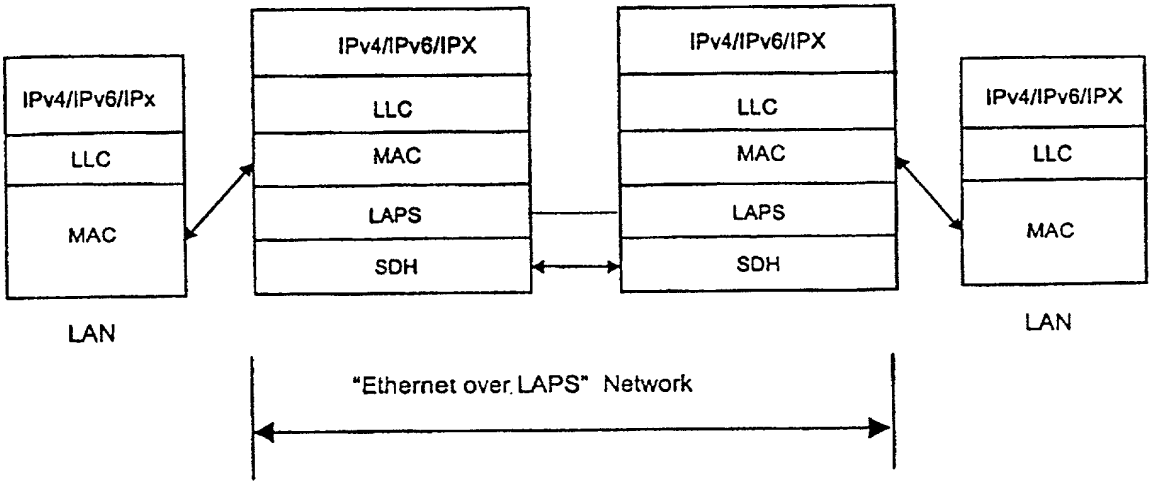
IPv4/IPv6/IPx
LLC
MAC
LAN
IPv4/IPv6/IPX
LLC
MAC
LAPS
SDH
IPv4/IPv6/IPX
LLC
MAC
LAPS
SDH
IPv4/IPv6/IPX
LLC
MAC
LAN
"Ethernet over LAPS" Network

Fig. 5

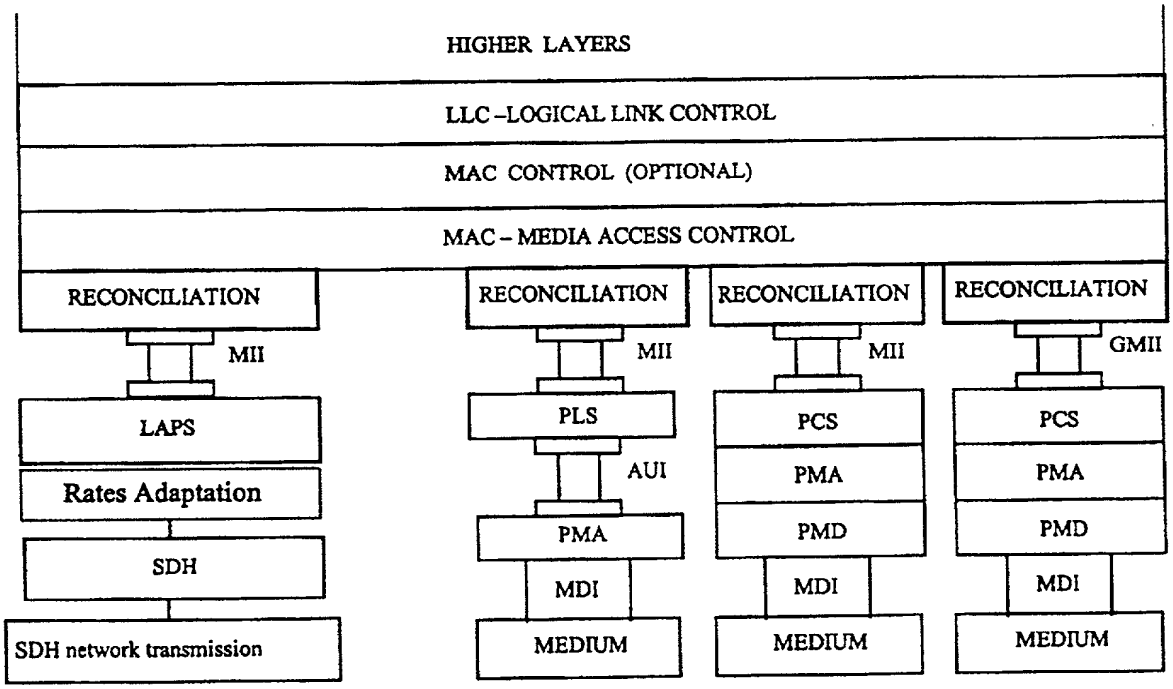
HIGHER LAYERS
LLC – LOGICAL LINK CONTROL
MAC CONTROL (OPTIONAL)
MAC – MEDIA ACCESS CONTROL
RECONCILIATION
MII
LAPS
Rates Adaptation
SDH
SDH network transmission
RECONCILIATION
MII
PLS
AUI
PMA
MDI
MEDIUM
RECONCILIATION
MII
PCS
PMA
PMD
MDI
MEDIUM
RECONCILIATION
GMII
PCS
PMA
PMD
MDI
MEDIUM

Fig. 6

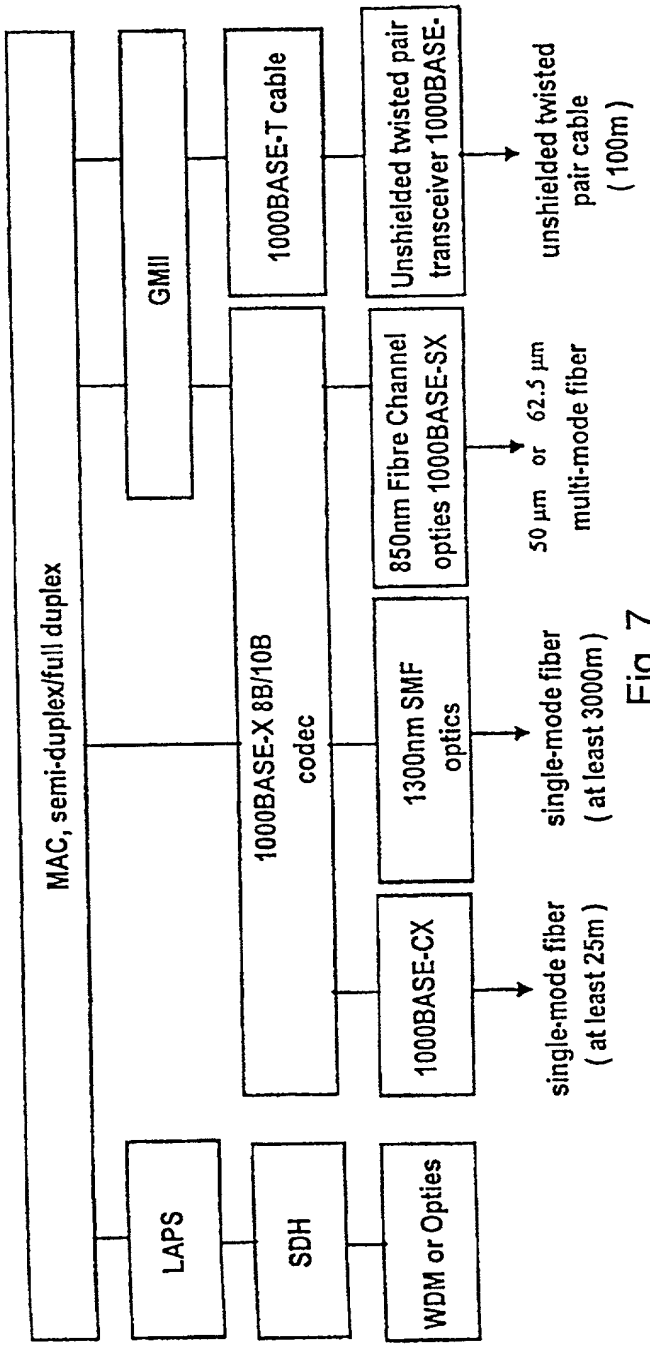
MAC, semi-duplex/full duplex
LAPS
SDH
WDM or Opties
GMII
1000BASE-X 8B/10B codec
1000BASE-CX
1300nm SMF optics
850nm Fibre Channel opties 1000BASE-SX
1000BASE-T cable
Unshielded twisted pair transceiver 1000BASE-
single-mode fiber (at least 25m)
single-mode fiber (at least 3000m)
50 µm or 62.5 µm multi-mode fiber
unshielded twisted pair cable (100m)

Fig. 7

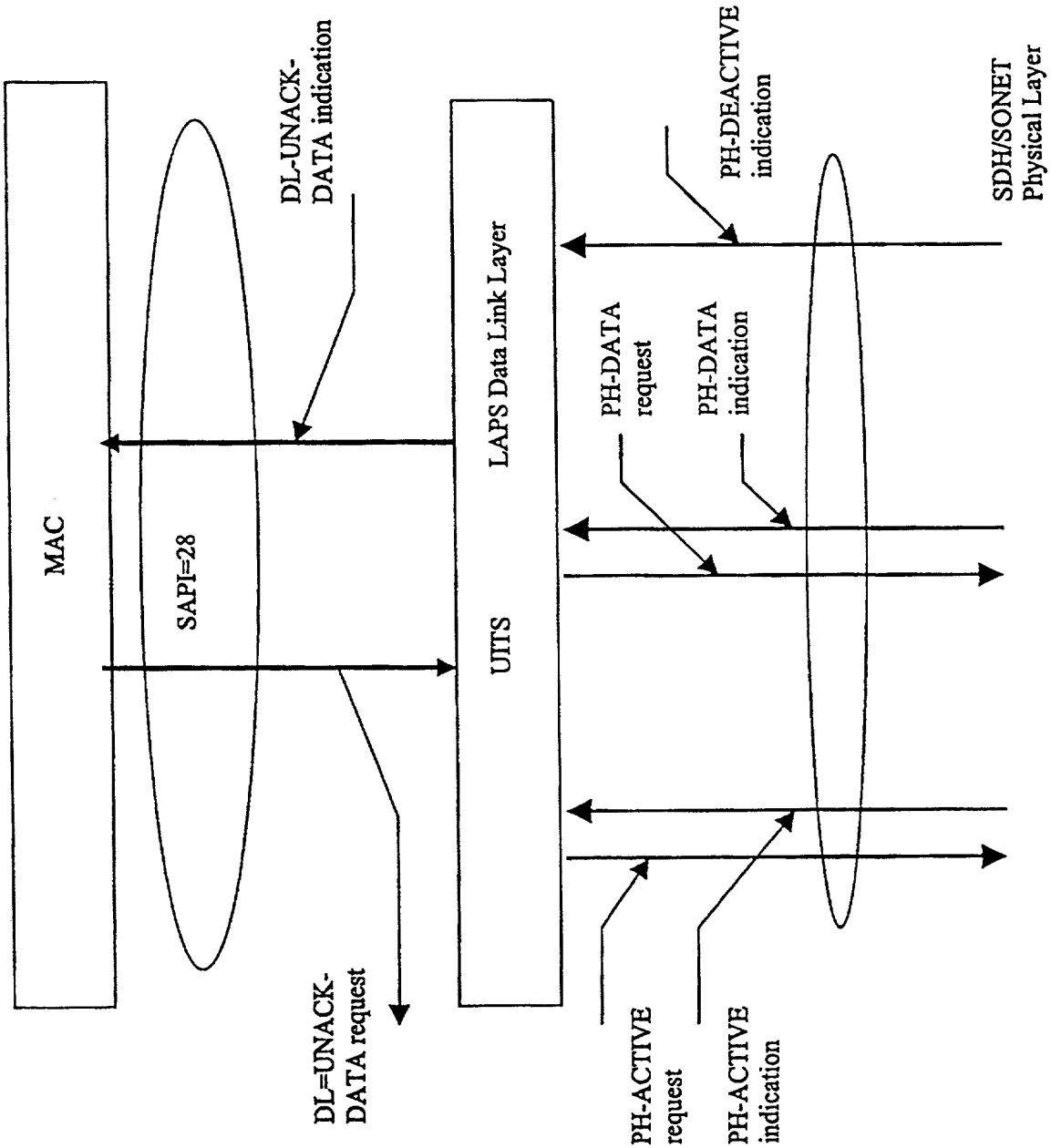
MAC
SAPI=28
DL-UNACK-DATA indication
DL=UNACK-DATA request
LAPS Data Link Layer
UITS
PH-DEACTIVE indication
PH-DATA request
PH-DATA indication
PH-ACTIVE request
PH-ACTIVE indication
SDH/SONET Physical Layer

Fig. 8

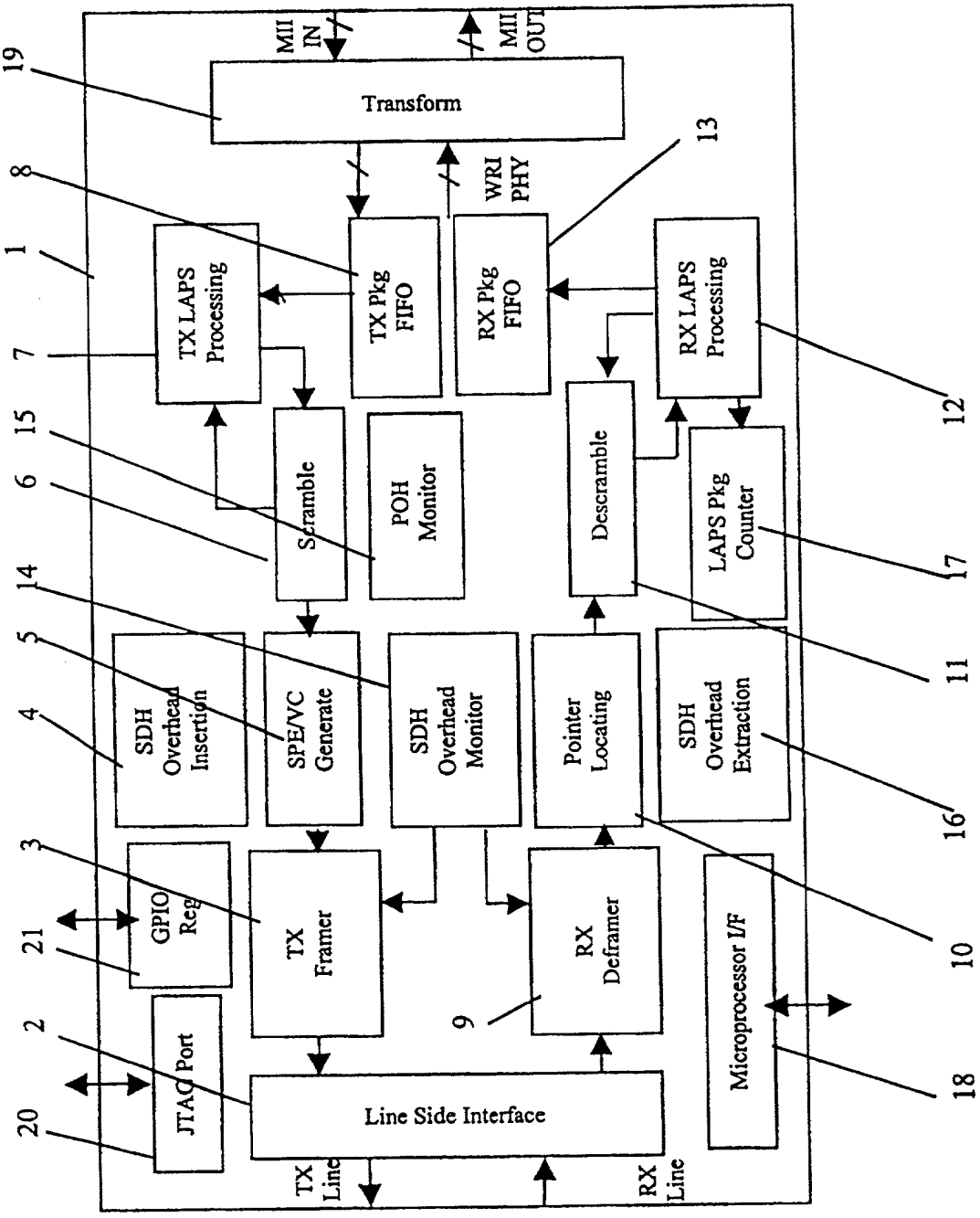
MII IN
MII OUT
Transform
WRI PHY
TX LAPS Processing
TX Pkg FIFO
RX Pkg FIFO
RX LAPS Processing
Scramble
POH Monitor
Descramble
LAPS Pkg Counter
SDH Overhead Insertion
SPE/VC Generate
SDH Overhead Monitor
Pointer Locating
SDH Overhead Extraction
GPIO Reg
TX Framer
RX Deframer
Microprocessor I/F
JTAG Port
Line Side Interface
TX Line
RX Line
19
8
1
7
15
6
14
5
4
3
21
2
20
13
12
17
11
16
10
9
18

Fig. 9

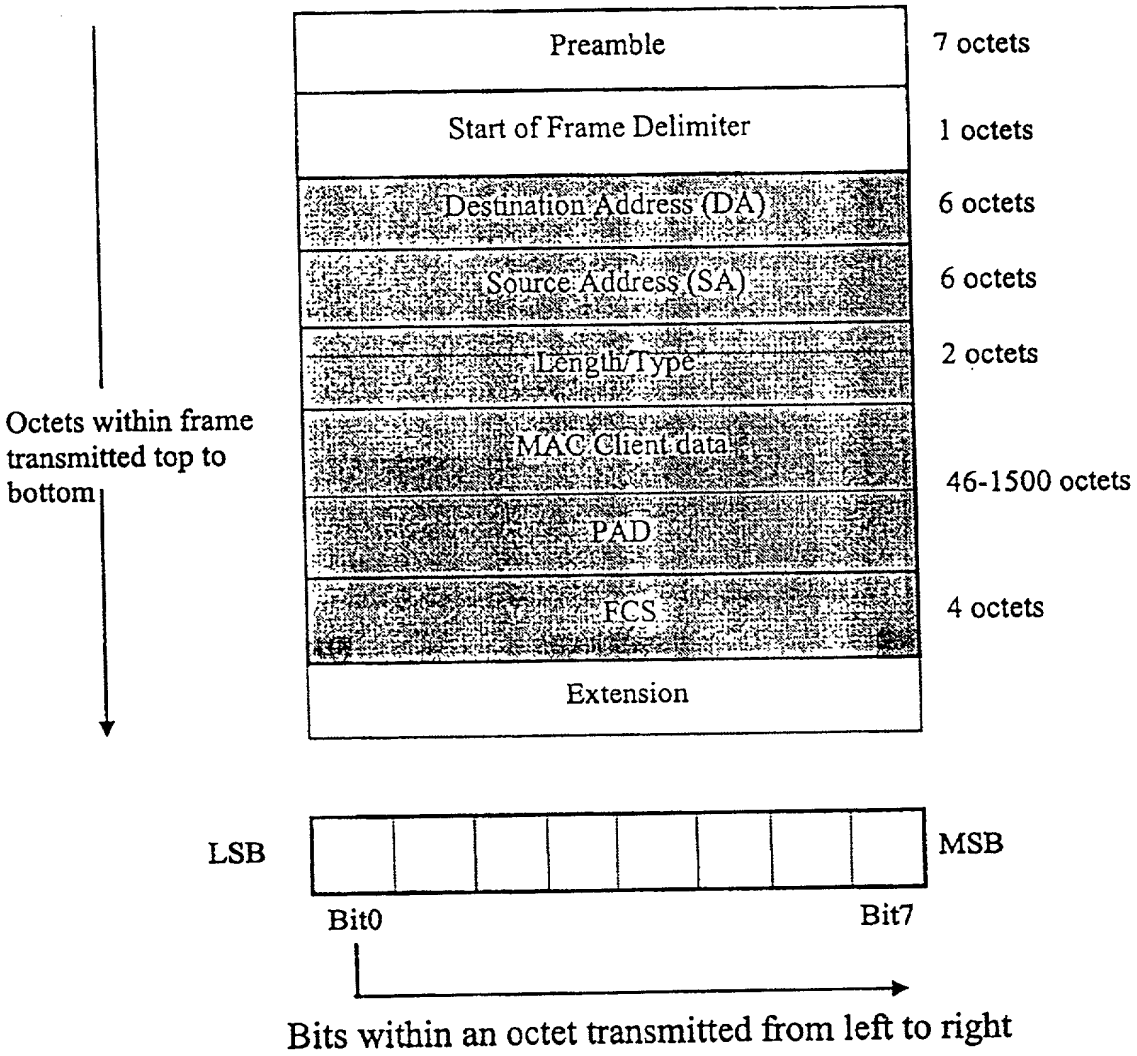
Preamble
7 octets
Start of Frame Delimiter
1 octets
Destination Address (DA)
6 octets
Source Address (SA)
6 octets
Length/Type
2 octets
MAC Client data
46-1500 octets
PAD
FCS
4 octets
Extension
Octets within frame transmitted top to bottom
LSB
MSB
Bit0
Bit7
Bits within an octet transmitted from left to right

Fig. 10

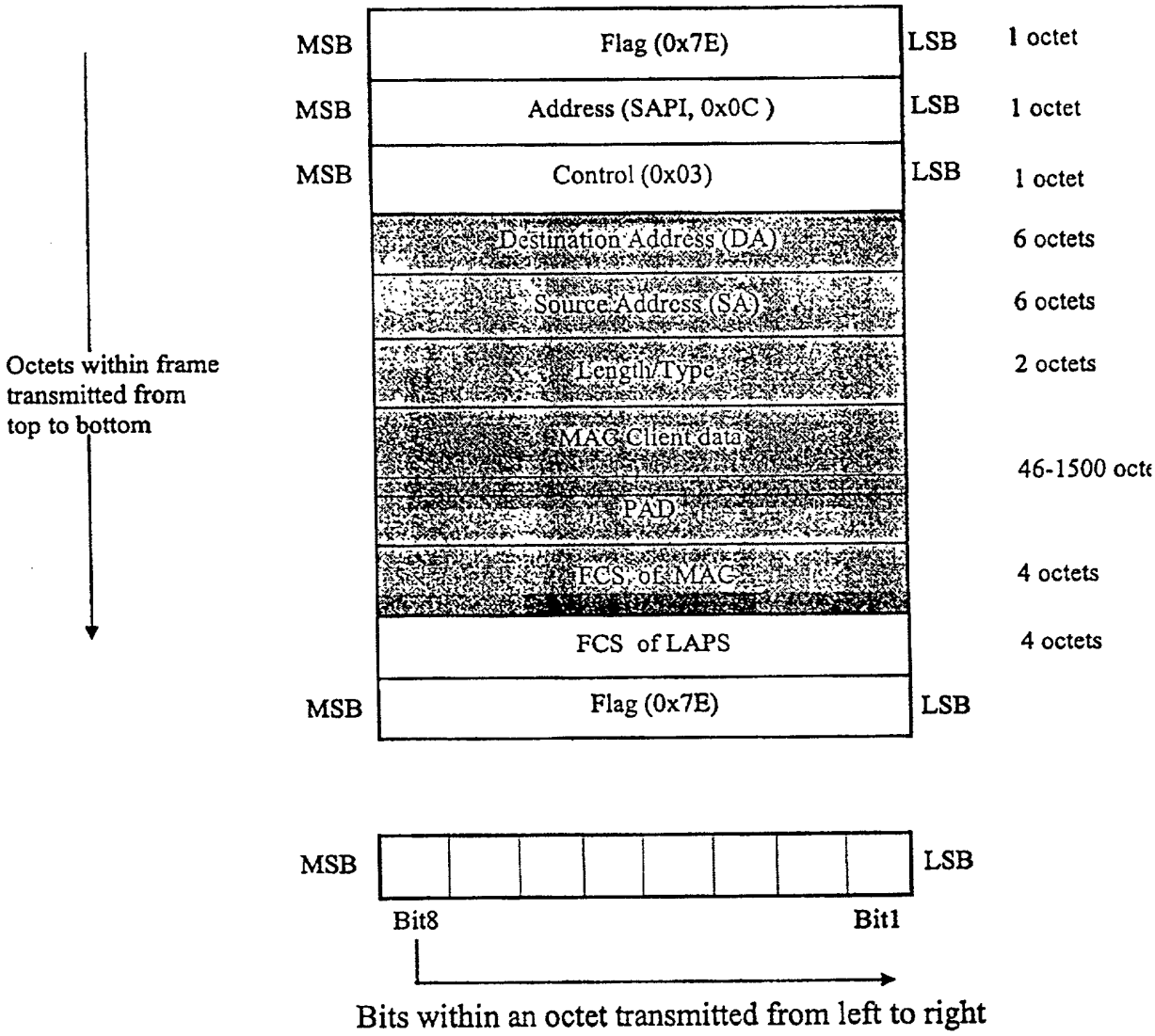
MSB
Flag (0x7E)
LSB
1 octet
MSB
Address (SAPI, 0x0C)
LSB
1 octet
MSB
Control (0x03)
LSB
1 octet
Destination Address (DA)
6 octets
Source Address (SA)
6 octets
Length/Type
2 octets
MAC Client data
PAD
46-1500 octe
FCS of MAC
4 octets
FCS of LAPS
4 octets
MSB
Flag (0x7E)
LSB
Octets within frame transmitted from top to bottom
MSB
LSB
Bit8
Bit1
Bits within an octet transmitted from left to right

Fig. 11

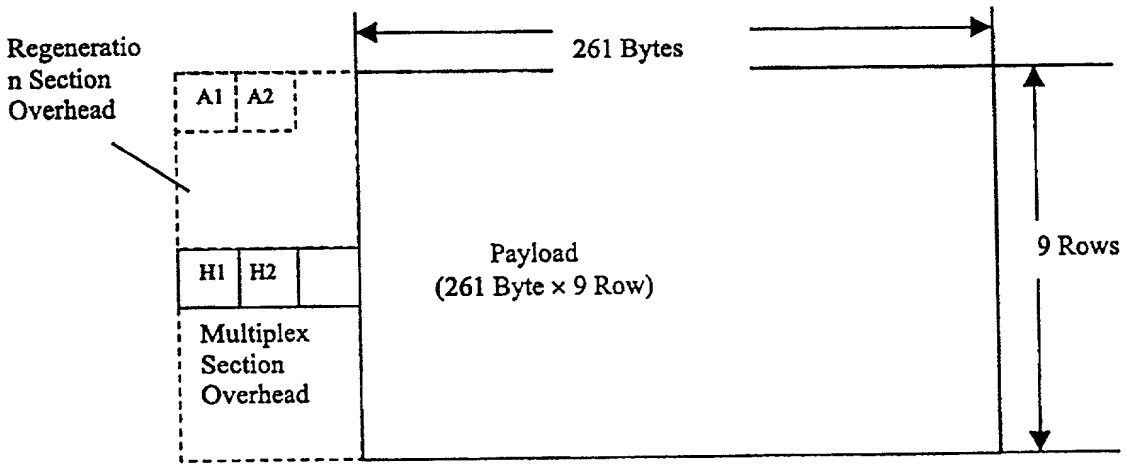
Regeneratio
n Section
Overhead
A1
A2
261 Bytes
H1
H2
Payload
(261 Byte × 9 Row)
9 Rows
Multiplex
Section
Overhead

Fig. 12A

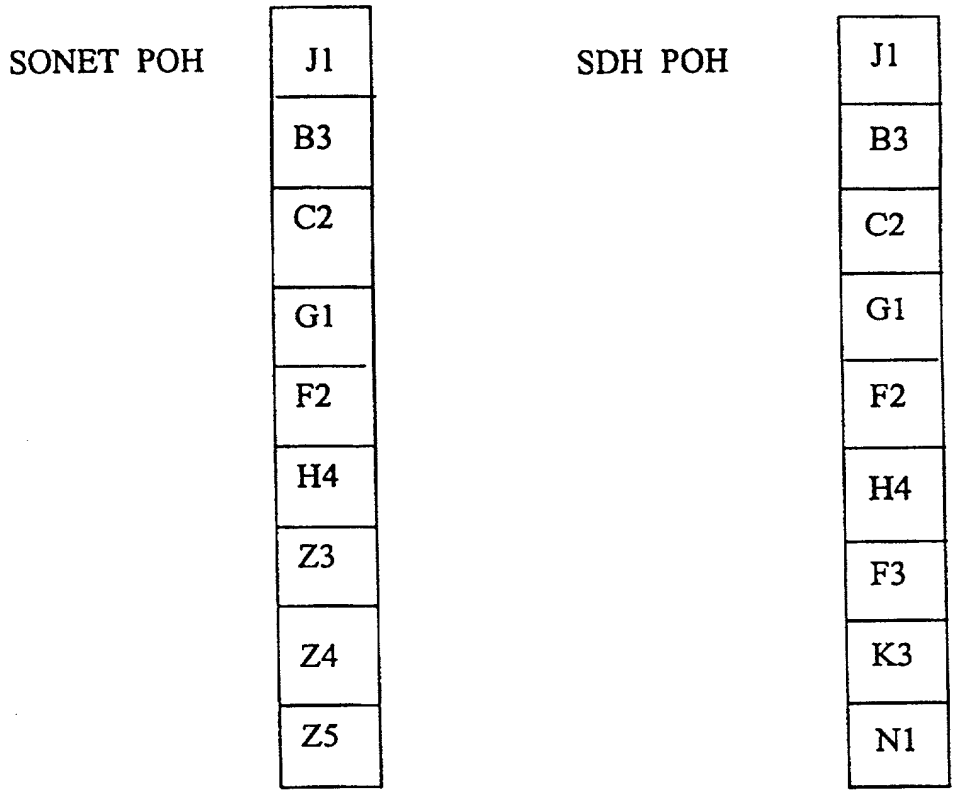

Fig. 12B

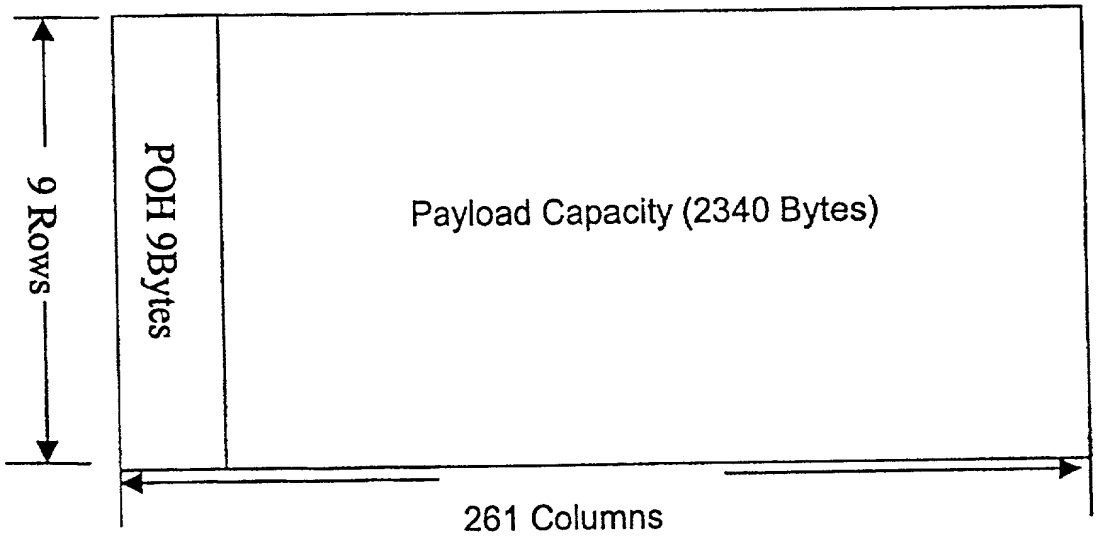

Fig. 12C

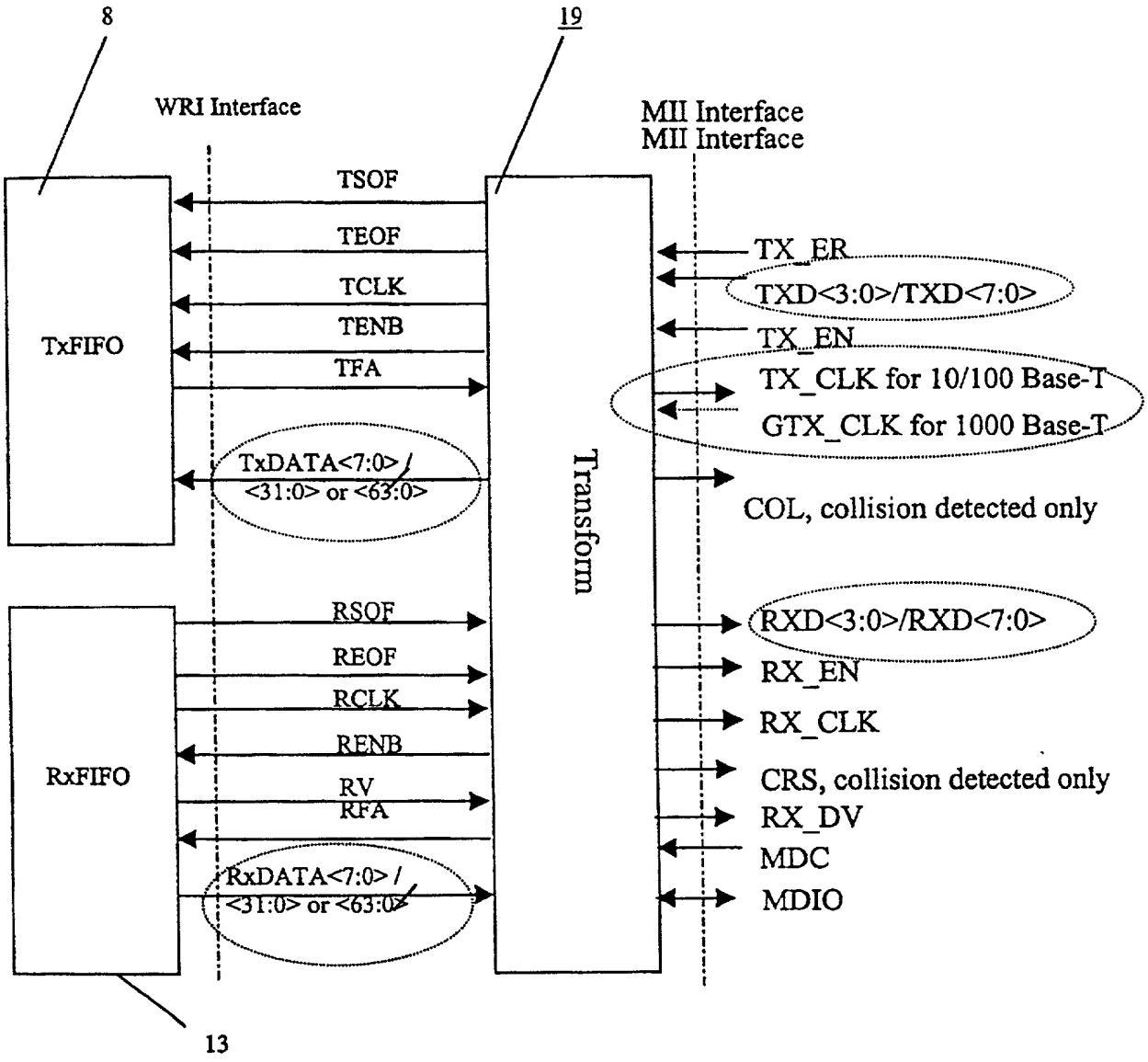
8
19
WRI Interface
MII Interface
MII Interface
TSOF
TEOF
TCLK
TENB
TFA
TxFIFO
TxDATA<7:0> /
<31:0> or <63:0>
Transform
TX_ER
TXD<3:0>/TXD<7:0>
TX_EN
TX_CLK for 10/100 Base-T
GTX_CLK for 1000 Base-T
COL, collision detected only
RSOF
REOF
RCLK
RENB
RV
RFA
RxFIFO
RxDATA<7:0> /
<31:0> or <63:0>
RXD<3:0>/RXD<7:0>
RX_EN
RX_CLK
CRS, collision detected only
RX_DV
MDC
MDIO
13

Fig. 13

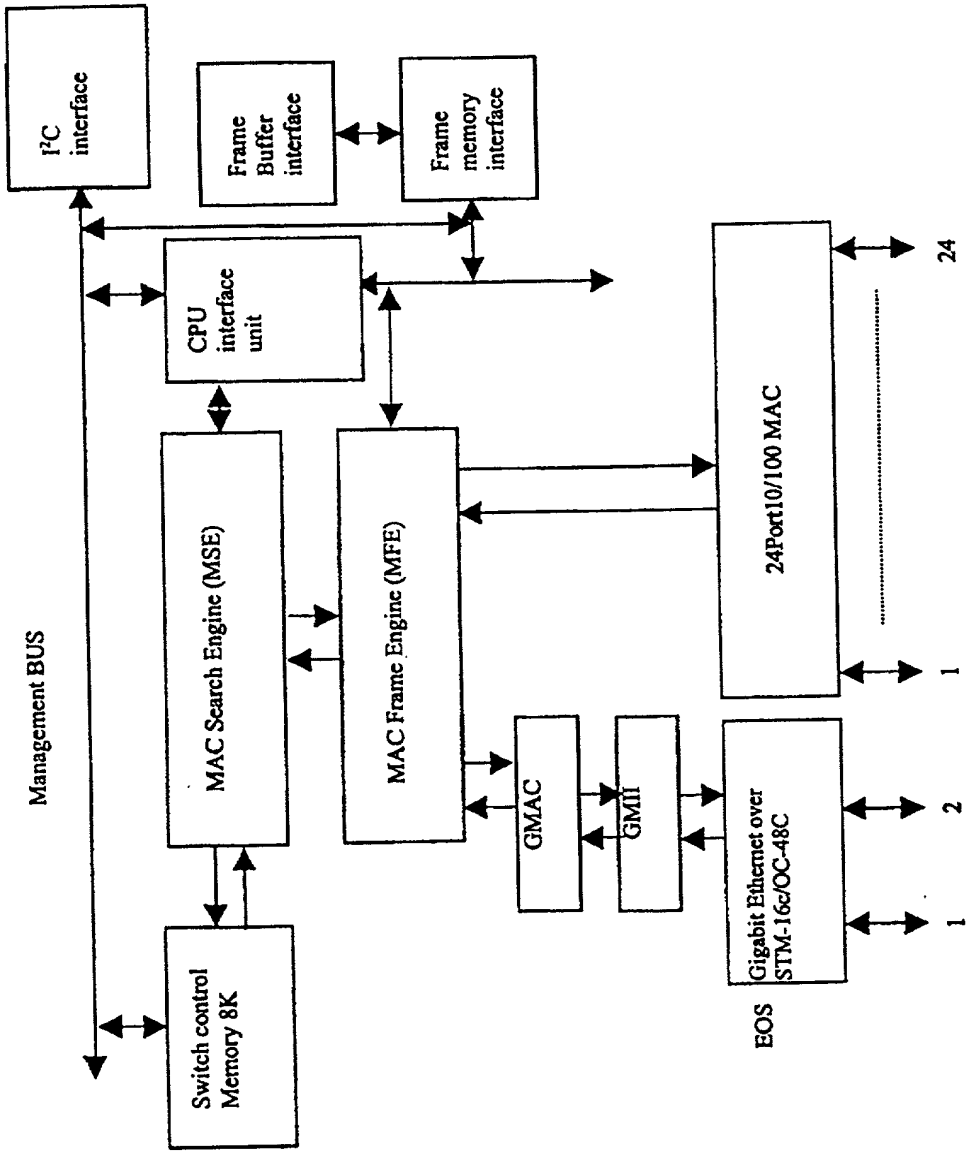
I²C interface
Frame Buffer interface
Frame memory interface
CPU interface unit
MAC Search Engine (MSE)
MAC Frame Engine (MFE)
24Port10/100 MAC
GMAC
GMII
Gigabit Ethernet over STM-16c/OC-48C
Switch control Memory 8K
Management BUS
EOS
24
1
2
1

Fig .14

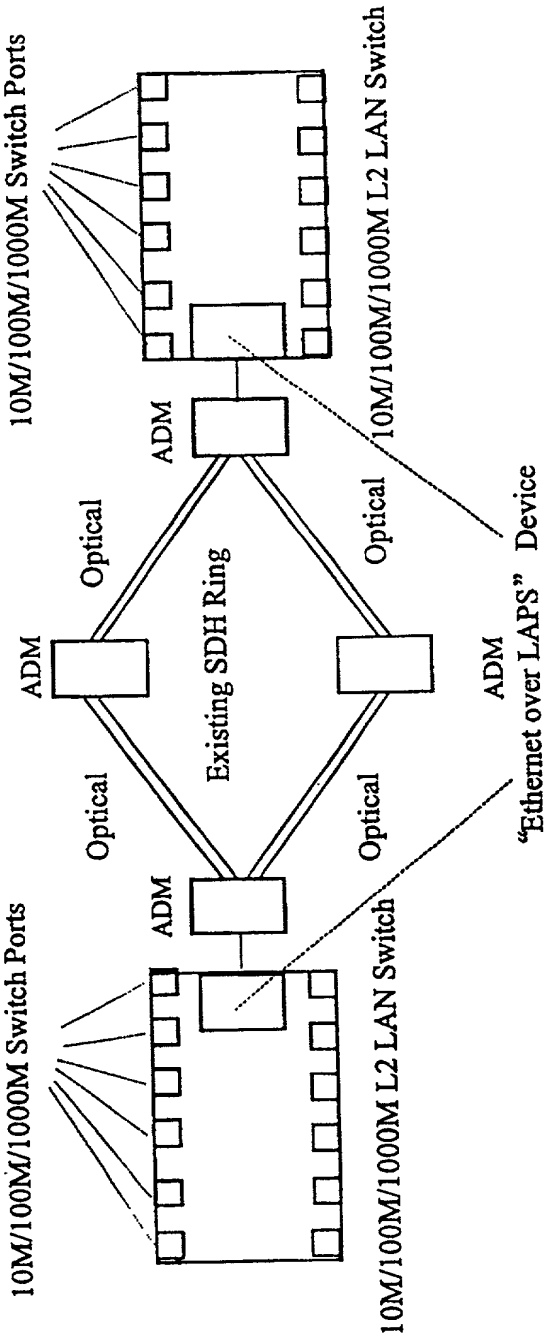
10M/100M/1000M Switch Ports
10M/100M/1000M L2 LAN Switch
ADM
Optical
Optical
ADM
Existing SDH Ring
ADM
Optical
Optical
ADM
"Ethernet over LAPS" Device
10M/100M/1000M Switch Ports
10M/100M/1000M L2 LAN Switch
ADM = Add and drop Multiplx

Fig. 15

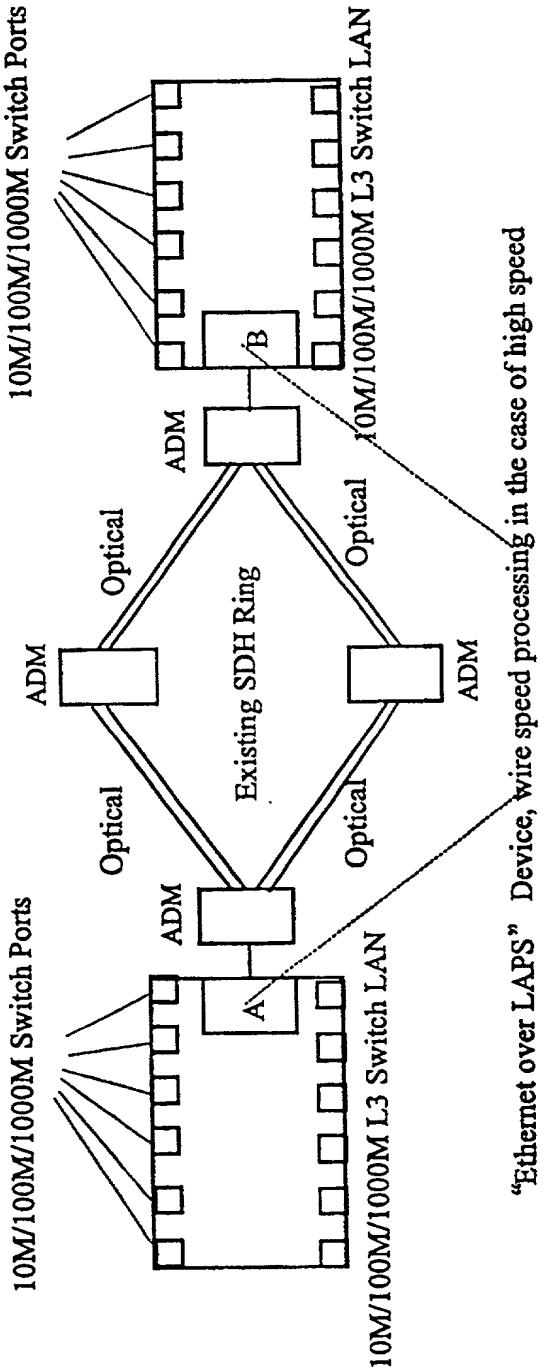
10M/100M/1000M Switch Ports
10M/100M/1000M L3 Switch LAN
B
ADM
Optical
Optical
ADM
Existing SDH Ring
ADM
Optical
Optical
ADM
A
10M/100M/1000M Switch Ports
10M/100M/1000M L3 Switch LAN
"Ethernet over LAPS" Device, wire speed processing in the case of high speed

Fig. 16

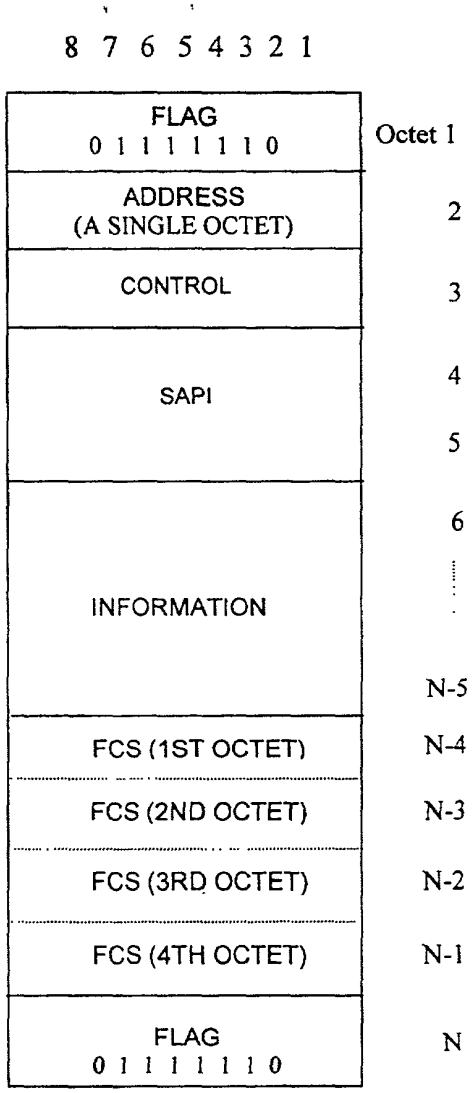
8 7 6 5 4 3 2 1
FLAG
0 1 1 1 1 1 1 0
Octet 1
ADDRESS
(A SINGLE OCTET)
2
CONTROL
3
SAPI
4
5
INFORMATION
6
N-5
FCS (1ST OCTET)
N-4
FCS (2ND OCTET)
N-3
FCS (3RD OCTET)
N-2
FCS (4TH OCTET)
N-1
FLAG
0 1 1 1 1 1 1 0
N

Fig. 17

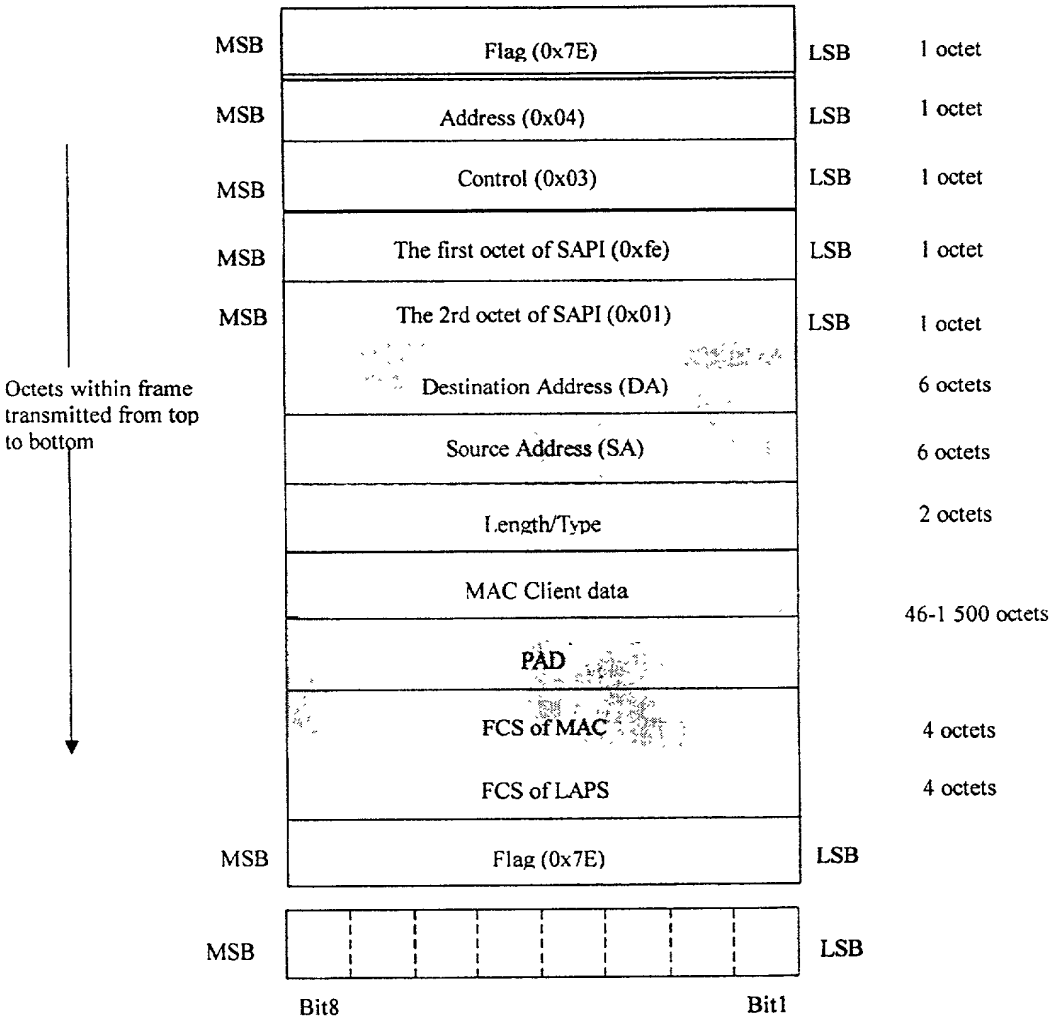
Octets within frame transmitted from top to bottom
MSB
LSB
Flag (0x7E)
1 octet
Address (0x04)
Control (0x03)
The first octet of SAPI (0xfe)
The 2rd octet of SAPI (0x01)
Destination Address (DA)
6 octets
Source Address (SA)
6 octets
Length/Type
2 octets
MAC Client data
PAD
46-1 500 octets
FCS of MAC
4 octets
FCS of LAPS
4 octets
Bit8
Bit1

Fig. 18

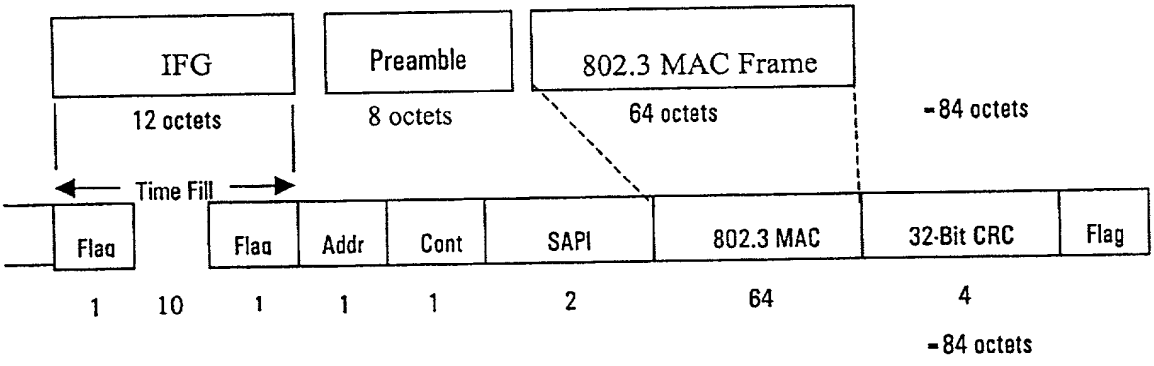
IFG
12 octets
Preamble
8 octets
802.3 MAC Frame
64 octets
=84 octets
Time Fill
Flag
Flag
Addr
Cont
SAPI
802.3 MAC
32-Bit CRC
Flag
1
10
1
1
1
2
64
4
=84 octets

Fig. 19